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STATE OF WASHINGTON
Dixy Lee Ray
Governor

DEPARTMENT OF ECOLOGY
Olympia, Washington 98504 206/753-2800

MEMORANDUM

October 11, 1978

To: Claude Sappington

From: John Bernhardt and Bill Yake

Subject: Water Quality Violation at Palouse Producer's, Inc.

During our 13-15 September 1978 Pullman survey we documented a serious water quality violation at Palouse Producers, Inc. (fertilizers and farm chemicals) Pullman plant. This report documents our findings.

For the receiving water portion of our survey, biological and water quality samples were collected at 18 stations spaced along the six-mile section of the Palouse River South Fork, extending from Paradise Creek above town to Armstrong Bridge below town (Figure 1). While sampling these sites the following important findings were made concerning the aforementioned water quality violation.

Biological

Routine checks made with an electrofisher during September 13 and 14 showed that fair numbers of fish (dace, shiners, suckers) were present in the South Fork above Pullman (station 1A) and at the USGS gaging station in town (station 4). However, the South Fork was devoid of fish life 3/4 mile below the USGS station at stations 6 and 7, located immediately above and below Pullman STP. A dead sucker (6" length) was observed near station 6. It appeared to be a recent mortality.

The electrofisher failed after station 7 was completed so the South Fork at Armstrong Bridge (station 12) was visually checked. No live or dead fish were observed. We then visually surveyed the stream area above Pullman STP to pinpoint the reason for the lack of fish. We determined that the source was Palouse Producers, located adjacent to the South Fork just below station 4 (gaging station). Although the company was not discharging while we were there, it was evident that toxic wastewaters recently had been discharged from a flexible plastic pipe originating on the company's grounds. An ammonia odor was apparent at the end of the pipe and yellowish material (probably $CaCO_3$) was deposited along the stream at and below the point of discharge (Photograph 1).

A visual inspection was then made of the South Fork below Palouse Producers. One dead dace and no live fish were observed in the 300 yard section of creek immediately below the plant. Algal and aquatic insect populations appeared to be substantially reduced. The affected area fanned out below Palouse Producer's discharge pipe, spanning the entire width of the stream about 200 feet downstream from the discharge. The streambed in the affected area had a coloration distinctly different from the upstream "normal" area, apparently due to lack of periphyton growth and mineral (apparently $CaCO_3$) deposits.

Missouri Flats Creek, a small stream that enters the South Fork a short distance below Palouse Producers, also was surveyed. Good numbers of live fish (dace) and aquatic macro-invertebrates were observed near the mouth.

Water Quality

Water quality data collected during the receiving water survey indicate Palouse Producers was having three main adverse impacts on the quality of South Fork waters (Table 1). Most importantly, ammonia-nitrogen levels were extremely high, increasing from 0.07 mg/l at station 4 (gaging station) to 21.0 mg/l detected below Palouse Producers at station 5. Un-ionized ammonia content at this site was calculated at 7.5 mg/l which exceeds by approximately 400 times the 0.02 mg/l lethal threshold established for freshwater aquatic life(1). Un-ionized ammonia concentrations exceeded safe levels as far downstream as Armstrong Bridge (3 2/10 miles below Palouse Producers) where 0.03 mg/l was present. Pullman STP may have contributed to the problem in the lower river.

Secondly, Palouse Producer's wastewaters substantially increased pH of the receiving waters. On September 14 a 7.8 pH was detected at station 4 (gaging station) with pH 9.3 detected at station 5 below the plant. Thirdly, the discharge increased stream temperatures by about 3°C. These are important changes because the percentage of un-ionized ammonia in ammonia solutions increases substantially as temperature and pH increase.

Facility Inspection

Palouse Producers was inspected during September 14 and 15 to determine the origin and chemical nature of the toxic wastewaters. Three representatives were contacted, owner Ron Wakter, manager Mike Fitzpatrick and operator Wally Hathaway.

The company had two discharges to the South Fork, (1) the scrubber and (2) the converter. These units are located next to the five aqueous storage tanks that are just north of the main office (photographs 1 and 2).

A schematic of the cooling water and scrubber systems is depicted in Figure 3. Heat is formed in the converter when the process water and anhydrous ammonia are combined. Non-contact water is introduced to cool the converter. The cooling water (at approximately 50°C) is discharged to the South Fork (photograph 3). The newly formed aqueous ammonia then is piped to the storage tanks.

Ammonia fumes that form in the storage tanks are pulled using negative pressure to a small scrubber which dissolves the gaseous ammonia in water. This is done to prevent the escape of the highly odorous gaseous ammonia which has, in the past, resulted in odor problems in downtown Pullman. The scrubber effluent normally is discharged into a sump on the company grounds where it is held for a period then transported for land disposal. However, at the time of our survey these wastewaters were being discharged via a flexible pipe to the South Fork (Photograph 1). There is no permit issued for the scrubber discharge, and apparently the management of Palouse Producers had made no application for permit, nor had it in any other way informed the department of this discharge.

Samples of the converter and scrubber wastewaters were collected and analyzed with the following results:

	Converter	Scrubber
Temperature (°C)	50°	- -
pH	9.0	11.2
Total Ammonia	150 mg/l	550 mg/l

The converter temperature was read from the gage on the tank. The scrubber temperature was about ambient. According to Mr. Hathaway waters in the scrubber normally contain about 0.5% (5000 mg/l) ammonia.

Discharge rates were also measured. Both the converter and scrubber were discharging at about 10 gpm at the time of our inspection. Mr. Hathaway stated that the discharges occur intermittently, while the plant is producing aqueous ammonia.

Comments

Late summer is a high production period for Palouse Producer's, Inc. Pullman plant while, at the same time, low flow conditions prevail in the S. F. Palouse River. The ability of the stream to dilute, or otherwise dissipate the harmful effects of this effluent is therefore minimal, and damage to the stream is maximized during this period.

Much of the data presented in Table 1 is not discussed in this report. A detailed analysis of these data will be given in an ensuing report on the STP Class II Inspection and Intensive Survey of the receiving waters.

JB:ee

cc: Dick Cunningham
Mike Palko
Rhys Sterling

LITERATURE CITED

1. _____, 1976. "Quality Criteria for Water", U. S. Environmental Protection Agency, Washington, D. C. 20460, Publication No. EPA-440/9-76-023.

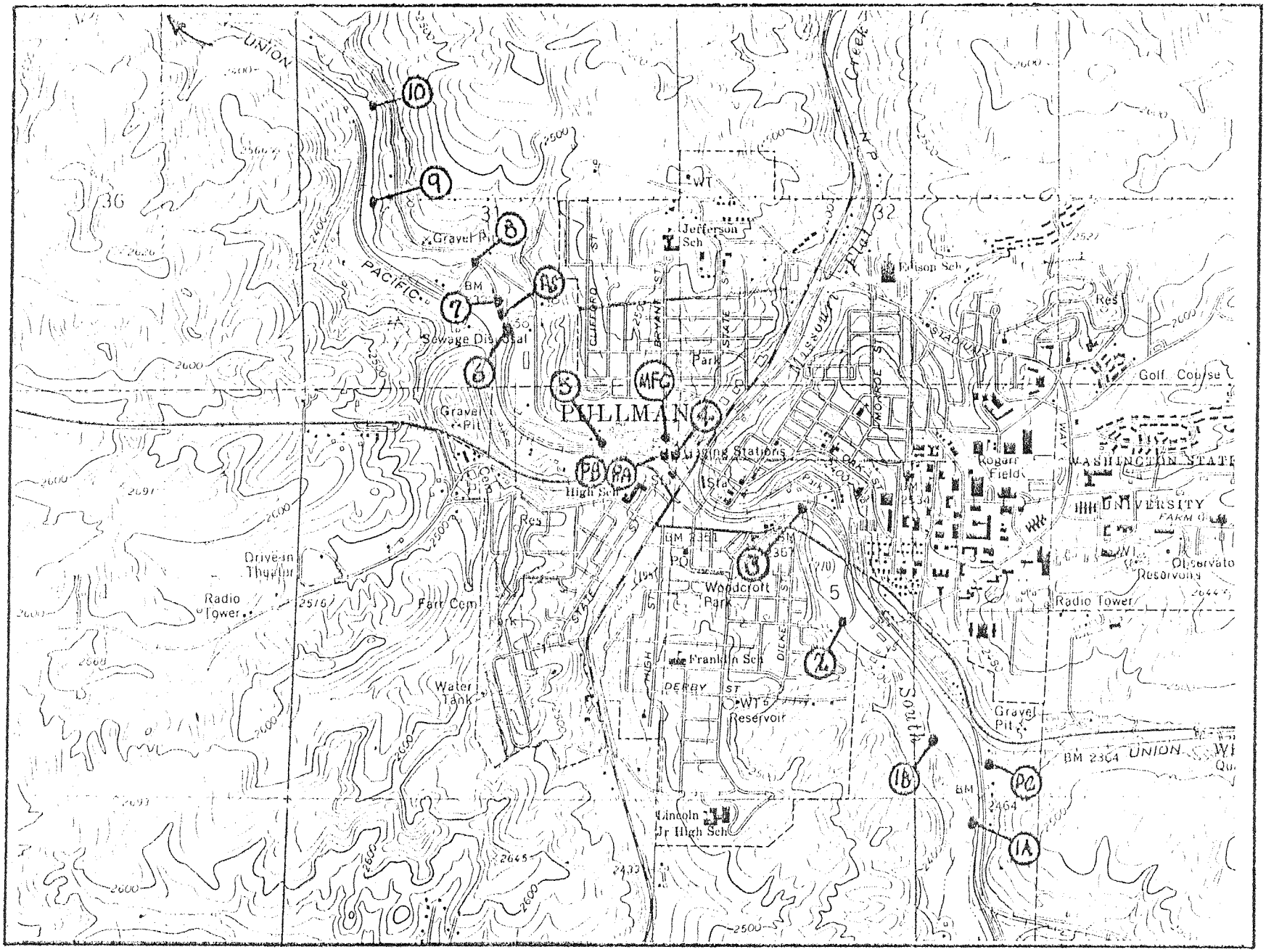


Figure 1. Map showing locations of stations sampled by DOE during Palouse River South Fork water quality survey, September 11 to 15, 1978.

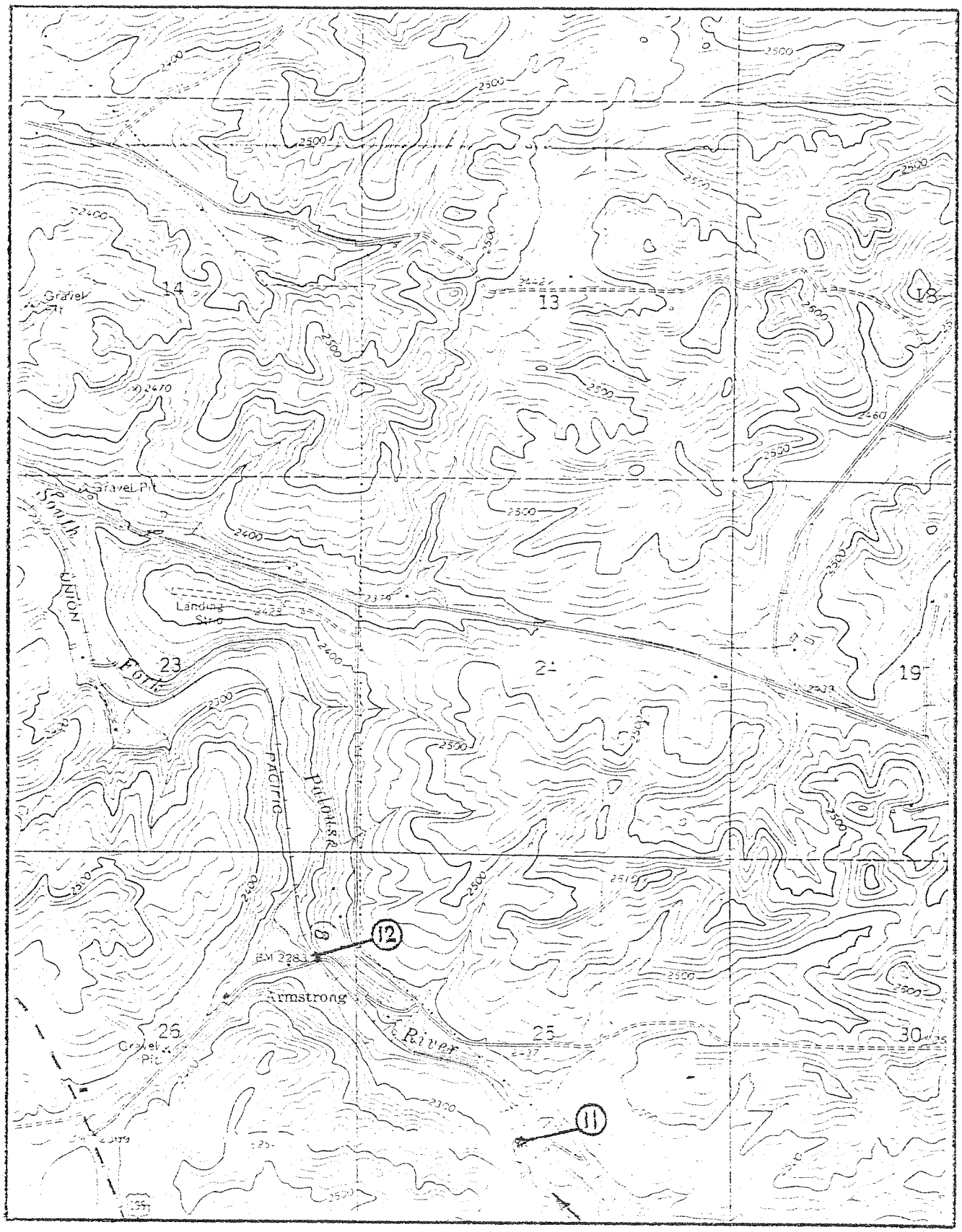


Figure 1. (Continued)

Figure 3

Ammonia

Conversion Schematic — Palouse Producers

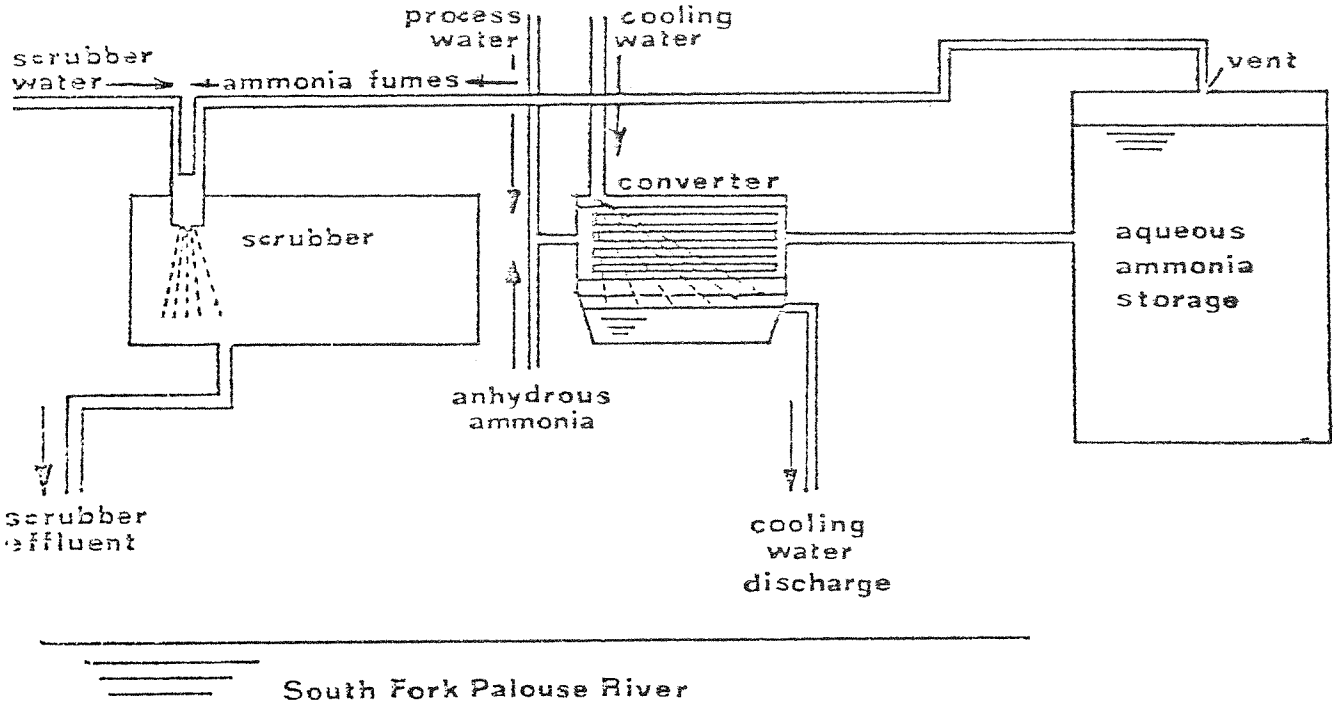


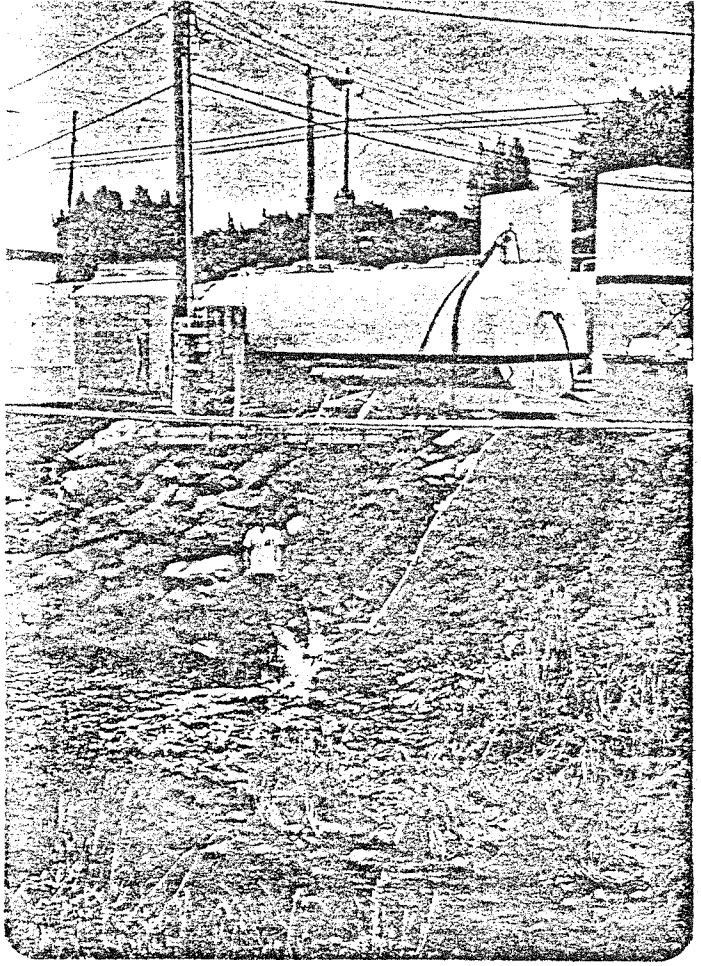
Table 1: Summary of Water Quality Data Collected by DOE during S.F. Palouse River Intensive Survey, September 13-14, 1978

Station	Description	Flow CFS	Flow MGD	Temp (°C)	S. Cond. (µmhos/cm)	pH	Turb. (NTU)	D.O. (mg/l)	COD (mg/l)	Total Coli. (col/100 ml)	Fecal Coli. (Col/100 ml)	Fecal Strep (Col/100 ml)
1A	SF Palouse above Paradise Cr.	0.59	0.38	10.1	289	7.9	5	9.3	24	700	100	40
1B	SF Palouse below Paradise Cr.	- -	- -	11.4	529	7.8	4	9.8	32	9,000	180	70
PC	Paradise Creek at Mouth	3.20	2.05	11.2	592	7.8	5	9.0	15	7,500	170	100
2	SF Palouse at Tatuna Park	- -	- -	11.3	485	7.9	3	10.1	32	13,000	220	30
3	SF Palouse at Reany Park	- -	- -	12.5	517	7.8	5	12.3	48	8,000	420	60
4	SF Palouse at USGS gaging station	5.73	3.67	11.6	507	7.8	4	9.3	40	32,000	8200	60
MFC	Missouri Flat Creek at Mouth	0.36	0.23	12.1	406	7.8	3	8.4	8	6,800	940	570
PA	Palouse Producer Scrubber Effluent	- -	- -	- -	- -	9.0	- -	- -	- -	- -	- -	- -
PB	Palouse Producer cooling water effluent	- -	- -	50.0 1/	- -	11.2	- -	- -	- -	- -	- -	- -
5	SF Palouse below Palouse Producers	- -	- -	15.1	567	9.3	6	9.9	40	41,000	5200	790
6	SF Palouse above Pullman STP	5.32	3.41	13.4	586	9.2	7	10.3	55	>100,000	6400	1100
PS	Pullman STP effluent	4.16	2.66	19.0	593	7.4	4	6.2	67	5,700	80	150
7	SF Palouse 200 feet below STP	7.75	4.96	18.5	605	7.4	6	7.2	40	< 100	< 20	< 10
8	SF Palouse 800 feet below STP	- -	- -	17.7	612	8.4	7	8.5	40	< 100	< 20	< 10
9	SF Palouse 8/10 mile below STP	- -	- -	16.9	566	8.3	5	8.4	40	< 100	< 20	< 10
10	SF Palouse 4/10 mile below STP	- -	- -	16.6	533	8.2	4	7.4	40	< 100	< 20	< 10
11	SF Palouse 1 7/10 miles below STP	- -	- -	15.5	476	7.4	4	7.8	57	2,000	70	20
12	SF Palouse 2 5/10 miles below STP	- -	- -	14.9	490	7.4	4	8.4	38	- -	- -	- -

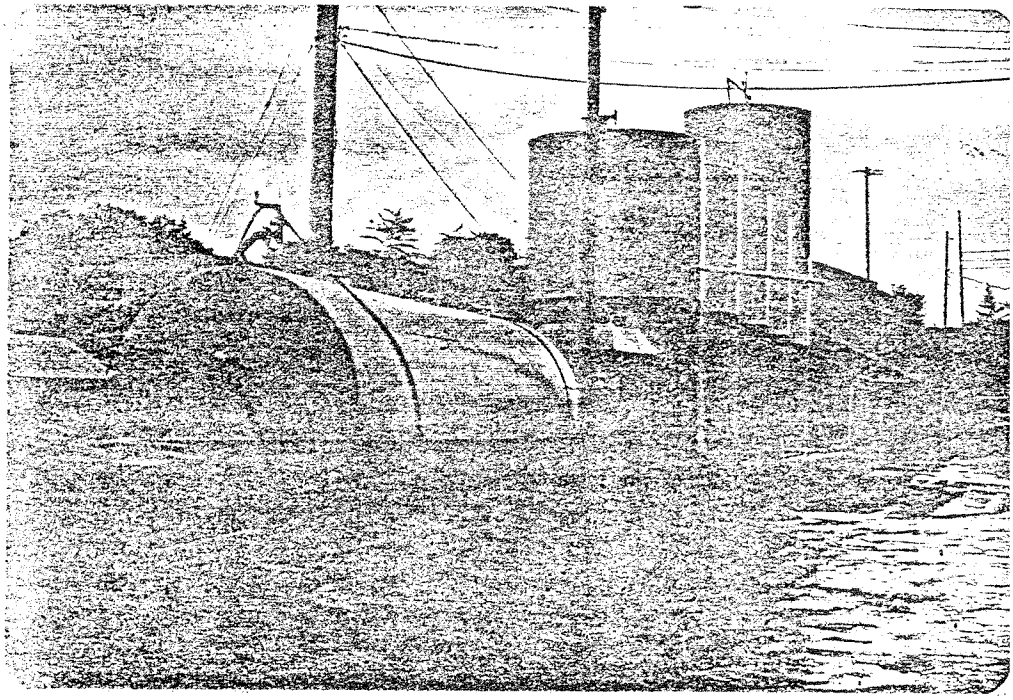
1/ Read from gauge on scrubber

Table 1: Summary of Water Quality Data Collected by DOE during S.F. Palouse River Intensive Survey, September 13-14, 1978 (Continued)

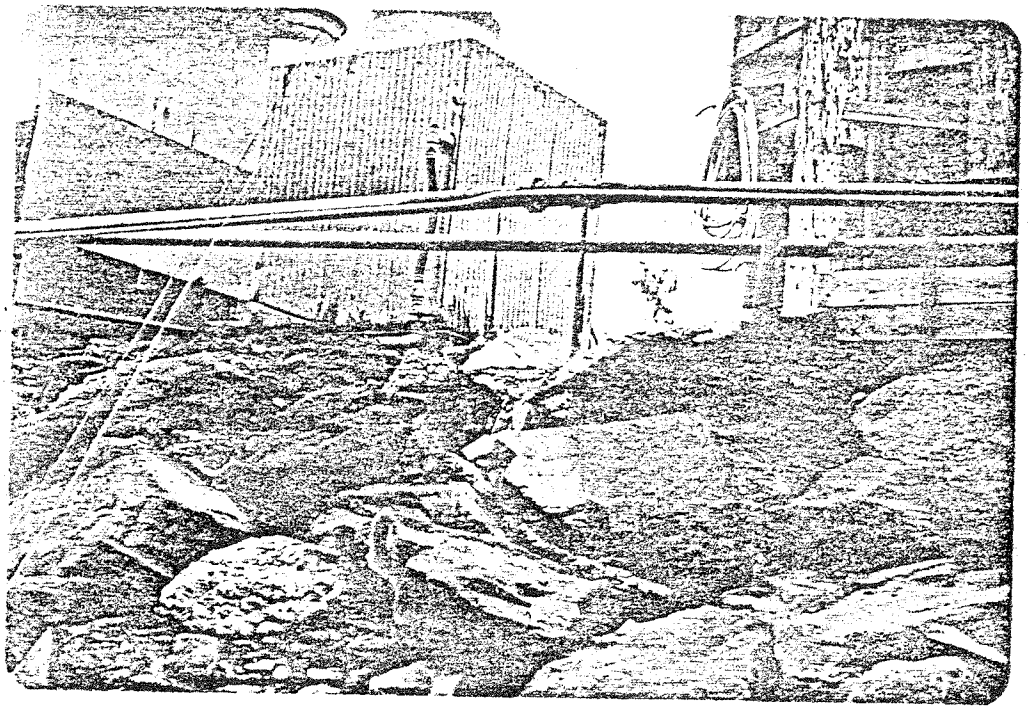
Station	Description	Nitrate-N (mg/l)	Nitrite-N (mg/l)	Ammonia-N (mg/l)	Un-ionized Ammonia (mg/l)	T. Kjeldahl-N (mg/l)	O. Phos. (mg/l)	T. Phosphate (mg/l)
1A	SF Palouse above Paradise Cr.	.03	.01	.02	< .001	.45	.12	.14
1B	SF Palouse below Paradise Cr.	7.1	.01	.02	< .001	- -	3.7	3.3
PC	Paradise Creek at Mouth	9.0	.10	.04	.001	2.09	5.1	2.1
2	SF Palouse at Tatuna Park	6.2	.01	.07	.001	1.6	3.0	3.0
3	SF Palouse at Reany Park	7.1	.02	.02	< .001	- -	3.2	3.6
4	SF Palouse at USGS gaging station	7.0	.03	.06	.001	18.0	3.1	3.0
MFC	Missouri Flat Creek at Mouth	1.5	.20	.07	.001	.90	0.2	.90
PA	Palouse Producer Scrubber Effluent	- -	- -	550	500+	- -	- -	- -
PB	Palouse Producer cooling water effluent	- -	- -	150	- -	- -	- -	- -
5	SF Palouse below Palouse Producers	8.0	<.01	21.0	7.53	- -	2.8	2.8
6	SF Palouse above Pullman STP	6.8	.20	20.0	5.67	21.0	2.5	2.5
PS	Pullman STP effluent	<.02	<.02	13.1	.116	- -	3.0	3.3
7	SF Palouse 200 feet below STP	3.4	<.01	16.0	.156	- -	2.5	2.5
8	SF Palouse 800 feet below STP	4.0	.20	16.0	1.362	> 10.0	2.6	2.7
9	SF Palouse 8/10 mile below STP	4.1	.60	9.8	.660	7.4	2.5	2.6
10	SF Palouse 4/10 mile below STP	4.4	.60	5.5	.298	9.2	2.9	9.2
11	SF Palouse 1 7/10 mile below STP	3.8	.50	2.9	.022	4.2	3.8	4.2
12	SF Palouse 2 5/10 mile below STP	2.8	.30	4.7	.035	5.4	5.3	5.4



Photograph 1. Palouse Producer's scrubber discharge pipe to S. F. Palouse River (Note yellowish deposition ($CaCO_3$) and discoloration of stream bed).



Photograph 2. Palouse Producer's scrubber in foreground, converter and five aqueous ammonia storage tanks in background.



Photograph 3. Palouse Producer's cooling water being discharged to S. F. Palouse River (Also visible by telephone pole in photograph 1).